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AVOIDING KIDNEY INJURY

80%

Reduction in unknown causes of AKI after Potsdam AKI Care Initiative protocol

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# Integrated Teams Drive Healthcare Transformation

BY KIMBERLY SCOTT

From alleviating worries about potential preeclampsia (PE) and improving treatment for patients with acute kidney injury (AKI) to automating testing of liver function, this year's UNIVANTS winners are transforming not only diagnostics but also complete networks of care through innovations in clinical laboratory medicine.

AACC has partnered with Abbott and other leading healthcare organizations in the launch of the UNIVANTS of Healthcare Excellence award. The award recognizes interdisciplinary teams around the world that have achieved measurable, innovative impacts within healthcare systems.

The teams being recognized in this first year of the award had to pass a high bar. To be eligible for the award, applicants had to be part of an integrated clinical care team focused on advancing healthcare and comprised of members from at least three different disciplines, including the laboratory. In addition, the project had to demonstrate measurable impact to patients, payors, clinicians, and health systems, and to capture metrics related to organizational key performance indicators (KPI), with at least one KPI measured quantitatively. Below, we profile three winners.

## Game Changer: Ruling Out Potential Preeclampsia

While PE, a hypertensive disorder of pregnancy, affects 4%-8% of women globally and causes major maternal and fetal morbidity and mortality, current methods for measuring blood pressure and proteinuria are suboptimal, identifying only about 20% of those at risk for adverse outcomes.

Based on previously published research, a laboratorian and an obstetrician with the United Kingdom's National Health Service (NHS) began using two angiogenic biomarkers to improve diagnosis and management of women presenting with a suspicion of PE. The team included Manu Vatish, MBBCh, an academic obstetrician with Oxford University, and Tim James, PhD, head biomedical scientist in the Clinical Biochemistry Department at the John Radcliffe Hospital in Oxford, England.

The initial stage of their research involved developing a protocol to assess mother and baby outcomes if patients suspected of PE were tested for the biomarkers soluble fms-like tyrosine kinase (sFlt-1) and placental growth factor (PlGF). While the obstetrical research community knew that the ratio of these biomarkers was elevated in pregnant women before the onset of PE, the ratio's predictive value and impact on care was unclear. Vatish's and James's work found clear diagnostic improvement and better outcomes when the tests were available: the risk of PE in the 7 days following testing of these two biomarkers was less than 1% in women with a sFlt1:PlGF ratio <38. For those with

a ratio of 38-85, the risk was 20% in the following 7 days, while those with a ratio >85 had a 56% risk of PE in the week following the test.

Just as important, this research found that the negative predictive value of the test was much higher and could safely help women who were at very low risk of PE avoid hospital admission. A low ratio has a 99.6% negative predictive value for developing PE within 7 days.

On the basis of the positive impact observed in the initial study and the clear improvements to diagnostic accuracy, the Oxford team introduced the protocol into routine clinical care in 2018. Initial analysis of hospital admissions shows a 20% decrease in PE-related admissions. The reduction has been mostly driven by the test's use at the hospital's maternity assessment unit, the equivalent of an emergency department for pregnant women. The expectation, said James and Vatish, is that the reduction in admissions will continue to increase as the test becomes more firmly embedded in clinical thinking.

Other hospitals in regions around Oxford already are rolling out the testing protocol, and clinicians from a number of countries have contacted Vatish and James about adopting the protocol. "There's a lot of interest in South Africa, where there is a high burden of PE," said James. "We've also had conversations with people in Canada, the Middle East, Israel, Japan, and China." The test protocol is currently under consideration by the Food and Drug Administration.

Adoption of this protocol will have a significant, positive effect on pregnant women across the globe, according to Vatish and James. "The assessment of a pregnant woman for preeclampsia hasn't changed for 80 years, so this test is a big evolutionary step," Vatish commented. "It's a game changer."

## Reducing Mortality from Acute Kidney Injury

AKI is a major determinant of chronic kidney disease and cardiovascular mortality, but many patients with AKI are not properly identified. A multidisciplinary team involving internal medicine, laboratory medicine, and nephrology in Potsdam, Germany, found that fewer than 25% of patients who developed AKI during their hospital stay had the condition documented in their medical record. In addition, the same low percentage of patients benefited from their general practitioners being informed so appropriate follow up care could be provided.

**THIS TEST COMPARES TWO VALUES AND THEN ALERTS THE DOCTOR IF THERE IS A SIGNIFICANT INCREASE. THAT'S WHEN THE DOCTOR GETS PROMPTED TO CONSULT WITH A NEPHROLOGIST.**

**SABAN ELITOK, MD**

The team joined forces in 2017 to see if they could develop a better method of identifying patients with AKI so that appropriate treatment could be started earlier. Saban Elitok, MD, the medical director of the Department of Nephrology and Endocrinology at Ernst-von-Bergmann Hospital in Potsdam, worked with Michael Haase, MD, a physician with the Dialysis Center Potsdam and the Diaverum Kidney Care Center MVZ Potsdam, affiliated with Otto-von-Guericke University Magdeburg, to develop a hospital-wide electronic AKI alert. They based the alert on increase of serum creatinine according to Kidney Disease Improving Global Outcomes AKI guidelines. The alert appears in a patient's medical record when there is a significant rise in creatinine based on one of two measures: Either delta creatinine exceeds 26 µmol/L within 48 hours (absolute criteria) or there is a 50% increase in delta creatinine compared to baseline within 7 days (relative criteria).

The first year of the initiative saw more than 1,000 AKI alerts and consults. Leveraging serum creatinine increase as a screening tool for all patients admitted to the hospital enabled the team to discover that 4.5% of all hospitalized patients had previously undiagnosed AKI.

Since the Potsdam AKI Care Initiative was launched, the rate of unknown causes of AKI has dropped by 80%, while AKI documentation has increased by twofold and AKI coding increased by threefold. Further, AKI complications have been reduced by more than 50%.

"Creatinine values were checked before, but if you are a neurologist or an orthopedic surgeon, you might not know when a certain value indicates a problem," explained Elitok. "This test compares two values and then alerts the doctor if there is a significant increase. That's when the doctor gets prompted to consult with a nephrologist."

The benefits of the Potsdam AKI Care Initiative are numerous. Not only are patients receiving appropriate kidney care, but also reductions in length of stay save overall healthcare costs. "Awareness of AKI has been relatively low in the past," said Haase. "Without this initiative, [patients are not recognized and] get lost in the system."

"The laboratory is an integral part of the project, along with the information technology department," added Elitok.

## Intelligent Liver Function Testing

Although liver disease is the fifth largest cause of death in the United Kingdom, patients continue to present with undiagnosed end-stage liver disease (ESLD) that likely could have been prevented with earlier diagnosis. Researchers with the University of Dundee and NHS Tayside in Dundee, Scotland, found a practical way to tackle this challenge. By standardizing the application and investigation of liver function testing (LFT) results using an intelligent evidence-based predictive algorithm, they substantially increased the early detection of liver disease while producing long-term cost savings for the health system.

At the study's onset, one third of the patients who presented in Dundee with previously undiagnosed ESLD died during their first visit. A retrospective analysis indicated that many of the deceased patients had abnormal LFTs in their patient history with little to no follow-up.

"Abnormalities are very common, and sometimes they are numerically relatively small, so they often get overlooked," explained John Dillon, MD, professor of hepatology and gastroenterology at the University of Dundee School of Medicine. "We assembled a group of hepatologists, gave them a set of information on patients, such as test results, patient body mass index (BMI), and alcohol use, and we asked them to make a diagnosis. They came up with 32 possible outcomes with different combinations of results. We had a high degree of clinical confidence in these rules and we ran them on about 300 patients to prove the results were accurate."

Ellie Dow, MD, a consultant in biochemical medicine, blood sciences, at NHS Tayside, then automated the testing so that abnormal results would automatically trigger additional reflex testing and produce reports that clinicians could use for treatment. "The challenge for me was to make the test very easy for family doctors to request and then give them results in a format they could easily understand. This helped them determine which

patients they could manage themselves in primary care and which patients should be sent to a liver specialist," explained Dow. "This really allows the lab to have an impact on patients with liver disease."

The intelligent liver function testing (iLFT) initiative was tested for a year before going live at NHS Tayside's Ninewells Hospital. Implementation involved a five-step process: 1) general practitioner (GP) chooses iLFT over standard LFT; 2) GP enters patient data for alcohol consumption, BMI, and features of metabolic syndrome; 3) if basic testing is outside defined parameters, the automated reflex cascade of additional tests is enabled to further characterize etiology; 4) results are automatically populated into diagnostic algorithms to identify a relevant diagnosis and management plan; 5) a report is made available to the GP in real time for action with access to the management plan electronically via web hyperlink.

Since implementation of the iLFT protocol in August 2018, the likelihood of a correct diagnosis of abnormal liver results has increased 52%, from 41% to 93%. The testing identified 2,350 patients who were then treated, resulting in improved quality of life and a longer lifespan. The iLFT protocol also increased appropriate escalation of care following abnormal LFT results from 41% using the previous standard to 100%. Based on the results, the researchers determined cost avoidance of £3,216 per patient, for a total lifetime cost avoidance at Dundee of more than £7 million.

"By implementing this test, we have truly maximized the value of liver testing while improving quality of care," said Dillon. "There's a lot more integration of lab services."

### Transforming Care From Within

Each of these cases illustrates how interdisciplinary teams have a critical role to play in advancing patient care. The clinical laboratory not only performs high quality testing but is integral to developing new, integrated care practices that can improve current standards of care.

To learn about other UNIVANTS winners, go to univantshce.com.

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## A **GLOBAL PASSION** FOR IMPROVING PATIENT CARE

The UNIVANTS of Healthcare Excellence Award recognizes teams who collaborate across disciplines to transform healthcare delivery and patient care. In its inaugural year, the teams being recognized come from seven countries around the globe.

### WINNERS

» **Intelligent Liver Function Testing: A Cost-Effective Way to Increase Early Diagnosis of Liver Disease,** University of Dundee, Dundee, Scotland

- John Dillon *(cover, row 1, column 1)*
- Ellie Dow *(cover, row 1, column 2)*
- Michael Hugh Miller *(cover, row 1, column 3)*
- Elizabeth Furrie *(cover, row 1, column 4)*
- Ian Kennedy *(cover, row 2, column 1)*
- Jennifer Nobes *(cover, row 2, column 2)*

» **Improving the Safety of Mothers and Babies Using Angiogenic Biomarkers for Preeclampsia,** Oxford University NHS Foundation Trust, Oxford, England

- Tim James *(cover, row 2, column 4)*
- Manu Vatish *(cover, row 3, column 1)*
- Matthew Covill *(cover, row 3, column 2)*
- Guy Checketts *(cover, row 3, column 3)*
- Julia Eades *(cover, row 3, column 4)*
- Sofia Cerdeira *(cover, row 4, column 1)*

» **Improved Diagnostic Pathway and Treatment for Hospitalized Patients With Acute Kidney Injury,** Ernst von Bergmann Hospital with the Dialysis Center Potsdam and the Diaverum Kidney Care Center MVZ Potsdam affiliated with Otto-von-Guericke University Magdeburg, Magdeburg and Potsdam, Germany

- Michael Haase *(cover, row 4, column 3)*
- Elisabeth Engelmann *(cover, row 4, column 4)*
- Saban Elitok *(cover, row 5, column 1)*
- Annemarie Albert *(cover, row 5, column 2)*
- Jens Ringel *(cover, row 5, column 3)*

### WITH DISTINCTION

» **Improving Clinical and Quality Outcomes for Prenatal Care—A Clinical Laboratory Driven Initiative,** TriCore Reference Laboratories, Albuquerque, New Mexico, U.S.

» **The Global Impact of Troponin and Biomarker on Ischemic Myocardial Injury and Surgical Care,** Hamilton Health Sciences/Population Health Research Institute, Hamilton, Ontario, Canada

» **Identifying Untreated Hepatitis B and Hepatitis C via Opt-out Screening Program in Urban ED Setting,** Guy's and St. Thomas' NHS Trust, London, England

» **Improving Quality, Patient Care and Experience, While Lowering Costs Through Enhanced Laboratory Stewardship,** Cleveland Clinic, Cleveland, Ohio, U.S.

» **Avoiding Insufficient Therapies and Overdosing With Co-Reporting eGFRs for Personalized Drug Therapy and Improved Outcomes,** Marienhospital, Stuttgart, Germany

» **Optimization of Heart Failure Management Using Biomarkers in Patients With Low Risk for Rehospitalization,** University Medical Center Groningen, Groningen, Netherlands

» **FH ALERT: Identification of Patients With Familial Hypercholesterolemia by Using the Expertise and Resources of the Clinical Laboratory,** SYNLAB Holding Deutschland GmbH, Augsburg, Germany

### WITH ACHIEVEMENT

» **Maximizing Patient Care in a Cost Conscious Environment,** Palestinian Medical Technology Association, Ramallah, Palestine

» **Increased Population Engagement, Enhanced Patient Experience and Safe Blood Donations Through Strategic Partnerships and Targeted Media Campaigns,** Dubai Health Authority, Dubai, United Arab Emirates

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